

PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark
Office
Box PCT
Washington, D.C.20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 08 September 1999 (08.09.99)	
International application No. PCT/IB98/00999	Applicant's or agent's file reference 40699 PCT/RR
International filing date (day/month/year) 29 June 1998 (29.06.98)	Priority date (day/month/year) 30 June 1997 (30.06.97)
Applicant CHORLEY, Brian et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

29 January 1999 (29.01.99)

☐ in a notice effecting later election filed with the International Bureau on:2. The election ☒ was☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer Peggy Steunenberg</p> <p>Telephone No.: (41-22) 338.83.38</p>
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PCT COOPERATION TREATY

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NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

PLEVY, Arthur, L.
Buchanan Ingersoll P.C.
500 College Road East
Princeton, NJ 08540
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (day/month/year) 07 October 1999 (07.10.99)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 40699 PCT/RR	
International application No. PCT/IB98/00999	International filing date (day/month/year) 29 June 1998 (29.06.98)

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

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Suite 450
4550 New Linden Hill Road
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United States of America

State of Nationality

US

State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☒ the name ☒ the address ☐ the nationality ☐ the residence

Name and Address

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Fairfield, NJ 07004
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State of Nationality

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State of Residence

US

Telephone No.

Facsimile No.

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

S. Baharlou

Telephone No.: (41-22) 338.83.38

PCT COOPERATION TREATY

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NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 07 May 1999 (07.05.99)	Applicant's or agent's file reference 40699 PCT/RR
International application No. PCT/IB98/00999	Priority date (day/month/year) 30 June 1997 (30.06.97)
International filing date (day/month/year) 29 June 1998 (29.06.98)	
Applicant CHORLEY, Brian et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:

03 February 1999 (03.02.99)

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made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
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Facsimile No.: (41-22) 740.14.35

Authorized officer

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Telephone No.: (41-22) 338.83.38

PCT COOPERATION TREATY

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NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

PLEVY, Arthur, L.
Buchanan Ingersoll P.C.
500 College Road East
Princeton, NJ 08540
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (day/month/year) 07 October 1999 (07.10.99)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference 40699 PCT/RR	
International application No. PCT/IB98/00999	International filing date (day/month/year) 29 June 1998 (29.06.98)

1. The following indications appeared on record concerning:

☐ the applicant ☐ the inventor ☒ the agent ☐ the common representative

Name and Address PLEVY, Arthur, L. Greenbaum, Rowe, Smith, Ravin, Davis & Himmel, LLP Metro Corporate Campus I P.O. Box 5600 Woodbridge, NJ 07095 United States of America	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence

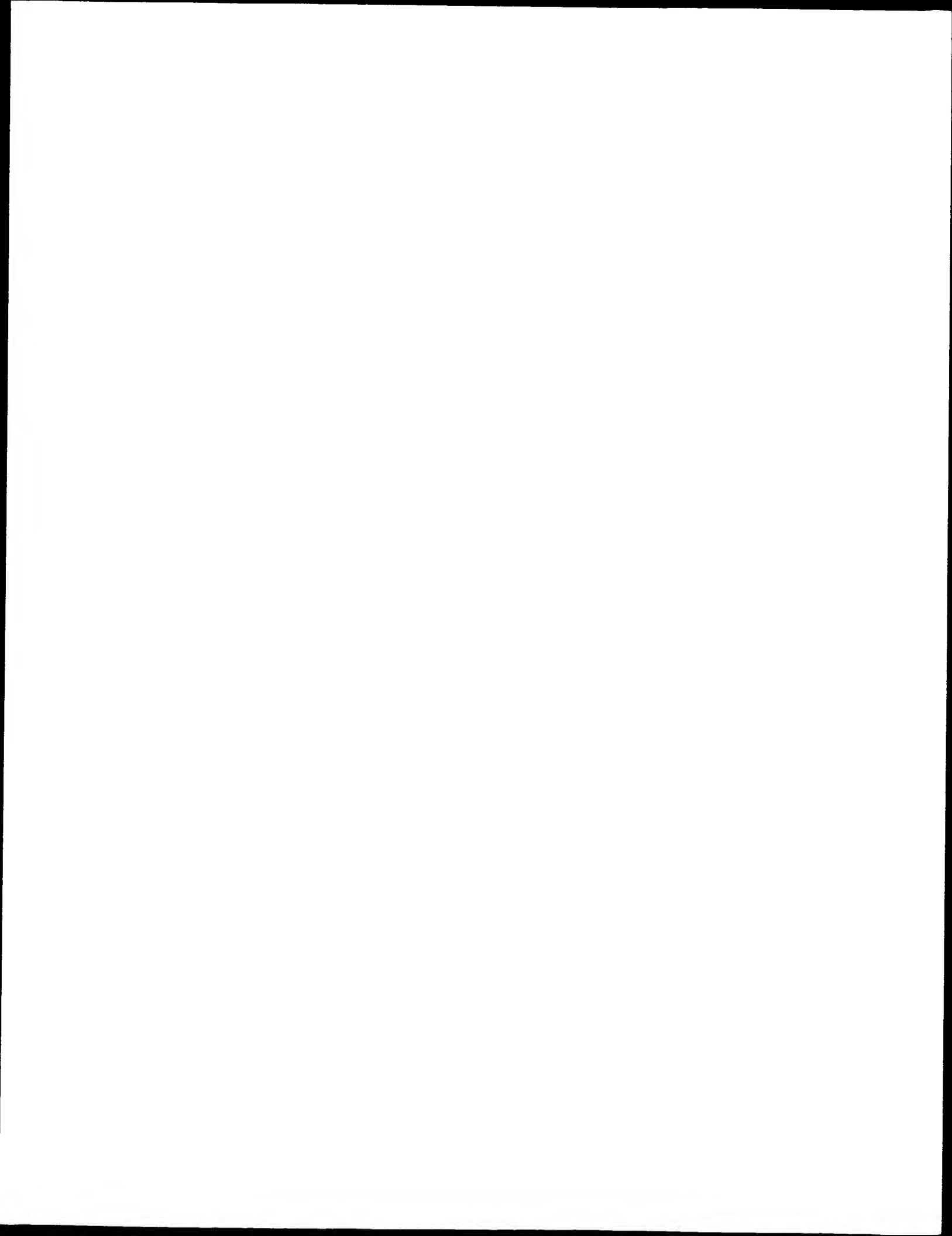
Name and Address PLEVY, Arthur, L. Buchanan Ingersoll P.C. 500 College Road East Princeton, NJ 08540 United States of America	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☒ the International Preliminary Examining Authority ☐ other:

<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer S. Baharlou</p> <p>Telephone No.: (41-22) 338.83.38</p>
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INTERNATIONAL SEARCH REPORT

International Application No

IB 96/00782

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 6 G06K7/08 G06K19/10 G07D7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06K G07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 166 273 A (GAO GES AUTOMATION ORG) 2 January 1986 see page 3, line 3 - page 4, line 23 see page 9, line 4 - page 11, line 4; figures 1-4 ---	1-4,8, 10,14-16
A	US 4 792 667 A (CHEN DANIEL Y-J) 20 December 1988 cited in the application see the whole document ---	1,14
A	WO 94 20932 A (AUTHENTICATION TECHNOLOGIES IN) 15 September 1994 see claim 1; figures 1-7 -----	1,10,14

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
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- "&" document member of the same patent family

Date of the actual completion of the international search

22 November 1996

Date of mailing of the international search report

09.12.96

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
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 Fax (+31-70) 340-3016

Authorized officer

Gysen, L

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/IB 96/00782

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0166273	02-01-86	DE-A- 3421041	12-12-85
		DE-A- 3584914	30-01-92
		JP-B- 6073998	21-09-94
		JP-A- 61059589	27-03-86
		JP-A- 6236474	23-08-94
		US-A- 4763927	16-08-88

US-A-4792667	20-12-88	NONE	

WO-A-9420932	15-09-94	US-A- 5394969	07-03-95
		AU-A- 4790993	26-09-94

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 40699 PCT/RR	FOR FURTHER ACTION <small>see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</small>	
International application No. PCT/IB 98/ 00999	International filing date (day/month/year) 29/06/1998	(Earliest) Priority Date (day/month/year) 30/06/1997
Applicant THE WHITAKER CORPORATION et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ **Certain claims were found unsearchable** (see Box I).

2. ☐ **Unity of invention is lacking** (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the **title**, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:

Figure No. 2 ☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.



INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 98/00999

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B42D15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 566 982 A (LEHUREAU ET AL) 22 October 1996 see the whole document ---	1
A	WO 97 07478 A (THE WHITAKER CORPORATION) 27 February 1997 see the whole document -----	1

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

° Special categories of cited documents:

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"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

24 September 1998

Date of mailing of the international search report

05/10/1998

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Evans, A



INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 98/00999

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
US 5566982	A	22-10-1996	FR	2707781 A	20-01-1995
			EP	0634732 A	18-01-1995

WO 9707478	A	27-02-1997	EP	0845127 A	03-06-1998



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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B42D 15/00

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(72) Inventors; and

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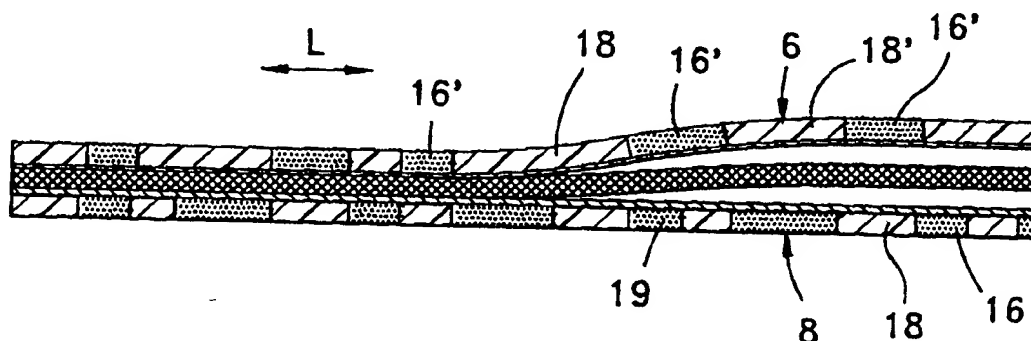
(74) Agents: REUTELER, Raymond, Werner et al.; AMP International Enterprises Ltd., AMPèrestrasse 3, CH-9323 Steinach (CH).

(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

With international search report.

(54) Title: SECURITY THREAD



(57) Abstract

A security thread (2), for identification of security documents such as banknotes, has a magnetic layer (4) sandwiched between polymeric layers (6, 8), where one of the layers (8) is a piezoelectric layer such as PVDF. The piezoelectric layer (8) may be poled intermittently such the piezoelectric layer is coded. A particularly compact security thread with enhanced multiple coded features is thus provided.



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SECURITY THREAD

This invention relates to a security thread for protecting documents, banknotes, or identification cards
5 against forgery.

In banknotes, it is common to find security threads in the form of thin strips imbedded in paper, such strips of a magnetic material provided with magnetic coding. The strip may be provided with a metallised layer either side
10 of the magnetic material, the metallisation also used to print fine characters as a further security feature. As mechanical support and protection, the magnetic material and metallisation layers are sandwiched between plastic (polyester) layers.

15 It is also known to provide piezoelectric film in security documents as described in US 4,763,927 or US 4,792,667, the presence of piezoelectric material being detectable by mechanical or pyroelectric testing means. In US 4,792,667, pre-poled films of polymeric material
20 made from polyvinylidene fluoride (PVDF) or other polymeric piezoelectric materials are fixed to documents for security. Piezoelectric films with poled regions may not provide sufficient security for certain documents such as banknotes.

25 It would be desirable to further enhance the security against forgery of security threads. It would also be advantageous to provide additional features in a security thread that enable easy detection or that provide a redundant control in the event the primary
30 security feature is defective. It is desirable to provide security means that are well adapted for manufacture in large quantities, and which are cost-effective to manufacture whilst enhancing security against forgery, reliability, and ease of detection.



It is an object of this invention to provide an improved security thread with enhanced security against forgery and ease of detection.

Objects of this invention have been achieved by providing the security thread according to claim 1. Disclosed herein is a security thread comprising a magnetic layer sandwiched between protective layers, wherein at least one of the protective layers is a piezoelectric polymer. Advantageously therefore, a particularly compact and cost-effective security thread is provided with enhanced security features. The magnetic material may be coded as is typical for conventional security threads, wherein the piezoelectric polymer layer may also have a series of juxtaposed poled and unpoled regions. The poled and unpoled regions may form a binary code such that both the magnetic and the piezoelectric layers have coding means; the magnetic layer being readable by a magnetic head, and the piezoelectric layer readable by a conductor or capacitive receptor after stimulation of the piezoelectric poled regions by mechanical (e.g. ultrasound) or pyroelectric (e.g. infrared rays) transmitters. On either side of the magnetic layer, there may be provided a metallisation layer, one of the metallisation layers thus being sandwiched between the magnetic layer and the piezoelectric layer and forming an electrode for the piezoelectric poled regions, in particular forming the ground electrode. The metal layer is reflective to light thereby concealing the magnetic layer, and forms a base for printing characters that can be read when light is passed through the metallisation layer. Compound security measures can thus be provided in a particularly compact security thread, requiring various detection means that enhances security against forgery.



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Further advantageous aspects of the invention are set forth in the claims, or will be apparent from the following description and drawings.

Embodiments of this invention will now be described
5 by way of example, with reference to the figures in which;

Figure 1 is a cross-sectional view through a security thread according to this invention, the thread shown partially laminated;

10 Figure 2 is a view similar to Figure 1 different embodiment according to this invention.

Figure 3 is a simple schematic view representing dipoles in a portion of piezoelectric layer taken in cross-section; and

15 Figure 4 is a simple schematic view illustrating how a piezoelectric layer is polarised.

Referring to Figure 1, a security thread 2 is shown in longitudinal cross-section. The security thread may be of substantially similar shape and dimension as a
20 conventional security thread embedded in banknotes or security documents, for example in the form of a thin elongate thread traversing a banknote. The security thread 2 comprises a magnetic layer 4 sandwiched between polymeric layers 6, 8 either side of the magnetic layer
25 4. The polymeric layers 6, 8 may be of different materials, for example a first layer 6 being of simple polyester or other flexible plastic material, and the second layer 8 being of a piezoelectric material such as polyvinylidene fluoride (PVDF) or other piezo electric
30 polymeric material. It is also possible to provide the second layer 8 as a simple flexible plastic layer such as polyester, coded or printed on one side thereof with a piezoelectric material such as polymer(VDF/TrVE) or vinylidene/tetrafluorethylene co-polymer (VDF/TFE).



The flexible polymeric layers 6, 8 are also protective layers that support and protect the magnetic layer 4 therebetween from mechanical damage. The magnetic layer 4 may be coded magnetically along its length (direction L) such that each security thread has a distinctive magnetic code readable by a detection device having a magnetic head. The magnetic layer 4 is shown in Figures 1 and 2 as a layer separately laminated between the polymeric layers 6, 8, but the magnetic layer may also be printed or deposited otherwise on one of the polymeric support layers 6, 8, for example the simple polymeric (polyester) layer 6. The polymeric layer 6 with the deposited magnetic layer 4 would then be bonded to the other polymeric layer 8 by means of a conventional adhesive.

A metallisation layer 10 is provided between the magnetic layer 4 and the piezoelectric layer 8. The metallisation layer 10 may be deposited on the piezoelectric layer 8 by sputtering or other conventional metal deposition methods for depositing metals on substrates or the like. The metallisation may also be etched in certain places to form characters that are readable when light is shone through the security thread. The electrode 10 further acts as a ground electrode for contacting an inner side 11 of the piezoelectric layer 8 to ground, the opposing other side 12 of the piezoelectric layer 8 being readable by a detection device, for example a conductive member biased thereagainst. When subject to mechanical deformation, piezoelectric material produces electrical charges, an electrical potential thus being developed between the inner and outer layers 11, 12. The electrical charge that develops can either be read by an electrical detector connected to the ground electrode 10 and the charge



electrode layer 12, or by capacitive detection means that responds to the electrical field created by the electrical charges. Piezoelectric materials such as PVDF also have a pyroelectric effect, whereby when subject to heat (for example from a light source emitting infrared) the heating of the piezoelectric creates an electric potential between the opposed layers 11, 12. Detection of the pyroelectric effect may for example be effected by the detection device described in International Application WO 97/07478.

As shown in Figure 1, the polymeric layer 6 may also be provided with a metallisation layer 14 on its inner side 15. This metallisation layer may similarly be provided with characters.

In the embodiment of Figure 1, the piezoelectric layer 8 is substantially uniformly charged (poled) piezoelectrically along the whole length thereof. As illustrated in Figure 2, in a second embodiment the piezoelectric layer 8 is provided with a series of poled regions 16 and unpoled regions 18. The poled and unpoled regions may have lengths that are multiples of a smallest bit length, as depicted in Figure 2 by the poled region 19, such that the piezoelectric layer 8 has a binary code extending along its length L. By mechanical excitation such as ultrasound, a conductive or capacitive detector can pick up the electrically charged areas along the length, thereby reading the binary code.

It is also possible to charge piezoelectric material such as PVDF, either negatively or positively such that certain of the poled regions are positive and certain of the poled regions are negative. In this way, it is also possible to provide a tertiary code rather than a binary code. The latter is illustrated in Figure 4 which schematically illustrates the dipole orientation in a



portion of polymeric piezoelectric layer. The horizontal dipoles 20 indicate a non-piezoelectric area and the vertical dipoles 21, 22 represent respectively negative and positively poled areas.

5 The coded piezoelectric layer 8 of the embodiment of Figure 2 can be made by positioning a ground electrode 24 against one side of the layer 8 (for example the metallised ground layer 10) and positioning charge electrodes 26 on the charge side 12 of the layer 8. The
10 charge electrodes 26 may be provided with a high positive or negative voltage depending on whether positive poled regions or negative poled regions are desired. The charge electrodes 26 may be held together in a single structure, with a dielectric (such as a ceramic or air) separating
15 the poling regions. The electrodes may be provided on a rotating drum, the grounded electrode forming a opposed rotating drum with the piezoelectric layer sandwiched therebetween such that a continuous lamination of the piezoelectric layer 8 with piezoelectric poling can be
20 effected.

As illustrated in Figure 2, the first polymeric layer 6 may also be a piezoelectric layer, for example charged with a binary code that may either differ from the binary code of the layer 8 as indicated by the
25 piezoelectric charged regions 16' and immediate non-charged regions 18'. It is also possible to provide the first layer 6 with the same binary code as the second layer 8 to enhance the reliability in the event one of the layers is defective. The second metallisation layer
30 14 could also act as the ground electrode for the piezoelectric layer 6 in a similar manner to the ground electrode for the piezoelectric layer 8.

A particularly compact security thread with enhanced security is thus provided. The means of detecting the



-7-

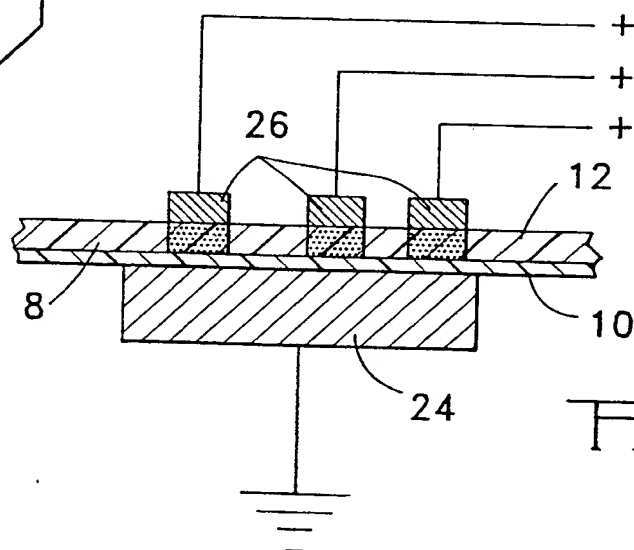
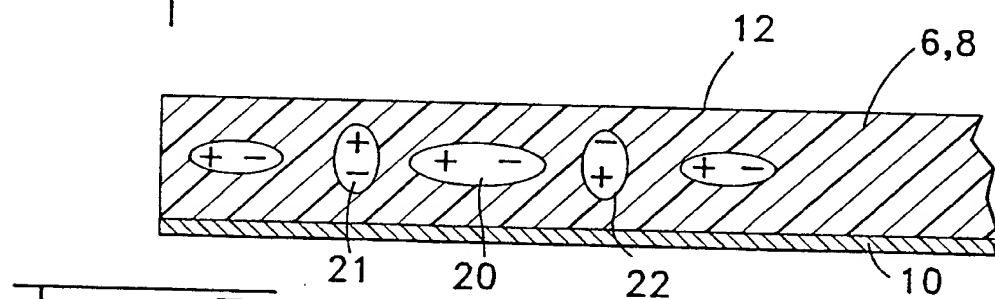
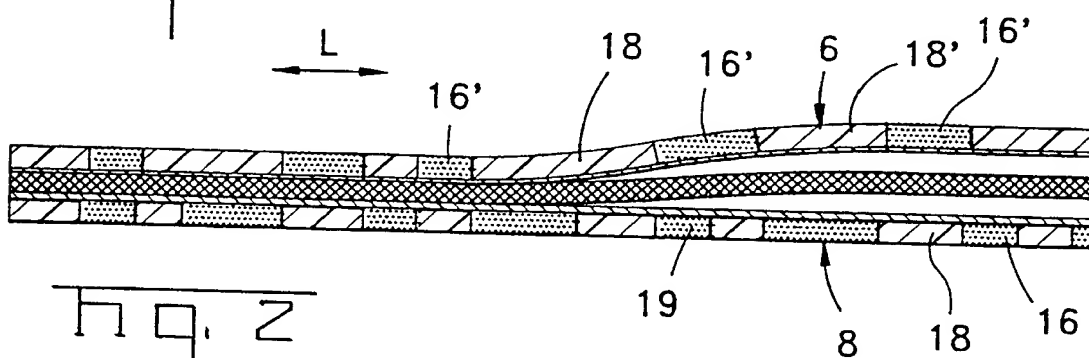
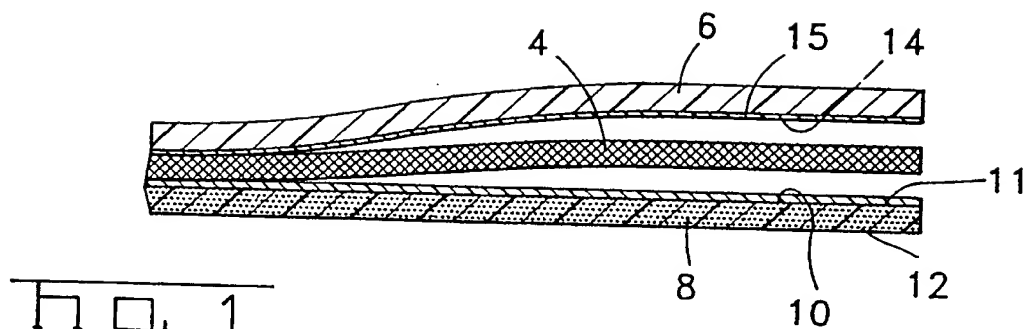
security thread based on different physical effects such as the magnetic field of the magnetic layer 4 and the electrical field or potential differences of the piezoelectric layer or layers 6, 8, significantly
5 increases difficulty of forgery.



CLAIMS

1. A security thread comprising a magnetic layer sandwiched between protective layers, wherein at least
5 one of the protective layers comprises a piezoelectric polymer.
2. The security thread of claim 1 wherein the piezoelectric polymer layer has poled and unpoled regions
10 forming a binary or tertiary code.
3. The security thread of claim 1 or 2 wherein a pair of the protective layers, one either side of the magnetic layer, is a piezoelectric polymer.
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4. The security thread of claim 3 wherein each of the piezoelectric layers has poled and unpoled regions.
5. The security thread of any one of the preceding
20 claims wherein the thread further comprises a metallisation layer between the piezoelectric polymer layer and the magnetic layer.
6. The security thread of claim 5 wherein the
25 metallisation layer acts as a ground electrode for the piezoelectric layer.







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INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 96/00782

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 G06K7/08 G06K19/10 G07D7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 G06K G07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 166 273 A (GAO GES AUTOMATION ORG) 2 January 1986 see page 3, line 3 - page 4, line 23 see page 9, line 4 - page 11, line 4; figures 1-4	1-4, 8, 10, 14-16
A	--- US 4 792 667 A (CHEN DANIEL Y-J) 20 December 1988 cited in the application see the whole document	1, 14
A	--- WO 94 20932 A (AUTHENTICATION TECHNOLOGIES IN) 15 September 1994 see claim 1; figures 1-7 -----	1, 10, 14



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *A* document member of the same patent family

Date of the actual completion of the international search

22 November 1996

Date of mailing of the international search report

09.12.96

Name and mailing address of the ISA

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Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-2016

Authorized officer

Gysen, L

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int'l Application No
PCT/IB 96/00782

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0166273	02-01-86	DE-A- 3421041	12-12-85
		DE-A- 3584914	30-01-92
		JP-B- 6073998	21-09-94
		JP-A- 61059589	27-03-86
		JP-A- 6236474	23-08-94
		US-A- 4763927	16-08-88

US-A-4792667	20-12-88	NONE	

WO-A-9420932	15-09-94	US-A- 5394969	07-03-95
		AU-A- 4790993	26-09-94

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference MSI	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB98/00999	International filing date (day/month/year) 29/06/1998	Priority date (day/month/year) 30/06/1997
International Patent Classification (IPC) or national classification and IPC B42D15/00		
Applicant MEASUREMENT SPECIALTIES INC., et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 29/01/1999	Date of completion of this report 4. 12. 99
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Louka, M Telephone No. +49 89 2399 2388 



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB98/00999

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

Description, pages:

1-7 as originally filed

Claims, No.:

1-6 as originally filed

Drawings, sheets:

1/1 as originally filed

2. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/IB98/00999

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims 1-6
	No: Claims
Inventive step (IS)	Yes: Claims 1-6
	No: Claims
Industrial applicability (IA)	Yes: Claims 1-6
	No: Claims

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/IB98/00999

Section V

Claim 1

According to page 1, lines 6-14, a security thread comprising a magnetic layer sandwiched between two protective plastic layers is known from the prior art. The subject-matter of claim 1 differs from the known security thread in that at least one of the protective layers comprises a piezoelectric polymer. This distinguishing feature solves the problem of enhanced security against forgery and ease of detection.

The at least one piezoelectric polymeric layer permits the detection of the electric field or potential differences formed therein and hence increases the difficulty of forgery, when only the magnetic field of the magnetic layer is detected.

None of the available prior art documents discloses or suggests the addition of a piezoelectric polymer to the plastic protective layers known from the prior art.

The subject-matter of claim 1 is therefore fulfilling the requirements of Art. 33 (2), (3) PCT.

Claims 2-6

The additional features of these claims are only preferred embodiments of the invention specified in claim 1 and as such, they also fulfill the requirements of Art. 33 (2), (3) PCT.

Section VII

The features of the claims have not been provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Independent claim 1 has not been drafted in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would have been appropriate, with those features known in combination from the prior art (see page 1, lines 6-14) being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).



INTERNATIONAL SEARCH REPORT

Int'l Application No

PCT/IB 98/00999

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B42D15/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 566 982 A (LEHUREAU ET AL) 22 October 1996 see the whole document	1
A	WD 97 07478 A (THE WHITAKER CORPORATION) 27 February 1997 see the whole document	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

24 September 1998

Date of mailing of the international search report

05/10/1998

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Authorized officer

Evans, A



INTERNATIONAL SEARCH REPORT

Information on patent family members

In. tional Application No

PC 98/00999

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5566982 A	22-10-1996	FR 2707781 A EP 0634732 A	20-01-1995 18-01-1995
WO 9707478 A	27-02-1997	EP 0845127 A	03-06-1998

